

REMARKS

Claims 1-3, 7, 16, 17, 19-23, and 33-36 are pending. Claims 33-36 have been amended for purposes of clarity and these amendments are not narrowing amendments, nor do they introduce any new matter. Please note that these amendments comply with 37 CFR 1.116(b)(2)'s requirements for entry of an amendment after a final rejection, namely, they present the rejected claims in better form for consideration on appeal.

In view of the following remarks, all pending claims are believed to be allowable.

I. REJECTION OF CLAIM 16 UNDER 35 U.S.C. § 103(a).

Claims 16 was rejected under §103(a) as being obvious over U.S. Pat. No. 6,545,358 (Jeong) in view of U.S. Pat. No. 6,218,282 (Buynoski). Withdrawal of this rejection is requested for at least the following reasons.

i. Neither Jeong nor Buynoski teaches forming multiple vias over individual bond pads, as recited in claim 16.

As admitted in the pending Office Action, Jeong does not teach multiple vias formed over individual bond pads. (See OA dated 4/20/07, text just above the figure on page 4.) Although it has been alleged that Buynoski (Fig. 4) cures this deficiency by showing an integrated circuit having multiple vias 1 formed over individual bond pads (metal 1), the applicants respectfully disagree.

Buynoski clearly shows and states that metal layer 41 (not metal 1 as alleged) is a bond pad. See Buynoski at col 5, lines 65-67 (stating, "Reference numeral 41 denotes the bonding pad area, which is not covered by dielectric protective layers 40). Notably, the bond pad areas 41 do not have multiple vias formed over them, but rather have an exposed outer surface so that electrical leads can be connected thereto.

Because Buynoski fails to teach multiple vias formed over individual bond pads, Buynoski fails to cure the deficiencies of Jeong. Therefore, not all elements have been established and the prima facie case of obviousness has been rebutted.

As claims 17, 19-23, and 36 depend from claim 16, these claims are also believed to be in condition for allowance.

II. REJECTION OF CLAIM 1 UNDER 35 U.S.C. § 103(a).

Previously presented claim 1 was rejected under §103(a) as obvious over Jeong in view of U.S. Pat. No. 5,117,276 (Thomas). Withdrawal of this rejection is requested for at least the following reasons.

- ii. The proposed modification to Thomas (i.e., combining it with Jeong to obviate claim 1) would render Thomas unsatisfactory for its intended purpose. Therefore, there is no suggestion or motivation to make the proposed modification.*

Pending claim 1 requires a thick copper layer that is over metal regions disposed between dielectric regions, where tungsten plugs connect the thick copper to the metal regions.

Jeong allegedly teaches a thick copper layer (e.g., Fig. 2, upper metal layer 45, and col. 5, line 59-67), but fails to teach an uppermost layer comprising metal regions disposed between dielectric regions. Thomas allegedly teaches metal regions (e.g., Fig. 1K, first level of interconnects 26) disposed between dielectric regions (e.g., first dielectric layer 14, second dielectric layer 30). The issue is whether a person of ordinary skill in the art would form Jeong's copper layer (45) over Thomas's metal regions (26) and dielectric regions (14, 30) to obviate claim 1.

As set forth below, a person of ordinary skill would not make this modification because it would render Thomas unfit for its intended purpose.

At some points in Thomas's process (Fig. 1M and Fig. 2A), adjacent interconnect layers 26, 38, 50 are separated from one another by air gaps 53, such that the interconnects are "freely suspended" structures (e.g., col. 9 lines 8-19). Because these freely suspended interconnects are fragile, mechanical strengths of the layers are important (e.g., col. 9, lines 45-50). To this end, ***Thomas teaches that alloys containing copper, which tend to be "soft", have inferior mechanical strengths***

and teaches away from the use of these materials. See Thomas col. 12, lines 59-63 (stating, “*Because of its superior mechanical strength properties over pure aluminum or standard aluminum alloys contain[ing] Cu, this sandwich structure enables the use of aluminum as the primary material for the interconnects.*”) If alloys containing copper are too soft to be used in Thomas, then it seems that pure copper (which is likely softer than alloys containing copper) would also be incompatible with such a technology.

Therefore, a person of ordinary skill in the art would not be motivated to modify Thomas to include copper interconnects as taught in Jeong, because such a modification would render Thomas unfit for its intended purpose. Accordingly, claim 1 is non-obvious over the cited art, and withdrawal of the rejection is therefore requested.

As claims 2, 3, 7, and 33-35 depend from claim 1, these claims are also believed to be in condition for allowance.

III. CONCLUSION

For at least the above reasons, pending claims currently under consideration are believed to be in condition for allowance and notice thereof is requested.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

In addition, should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 20-0668, TI-36853.

Respectfully submitted,
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